Finding Cost-Effective Greenhouse Gas Reductions (2030)

CEC 2013 IEPR Workshop

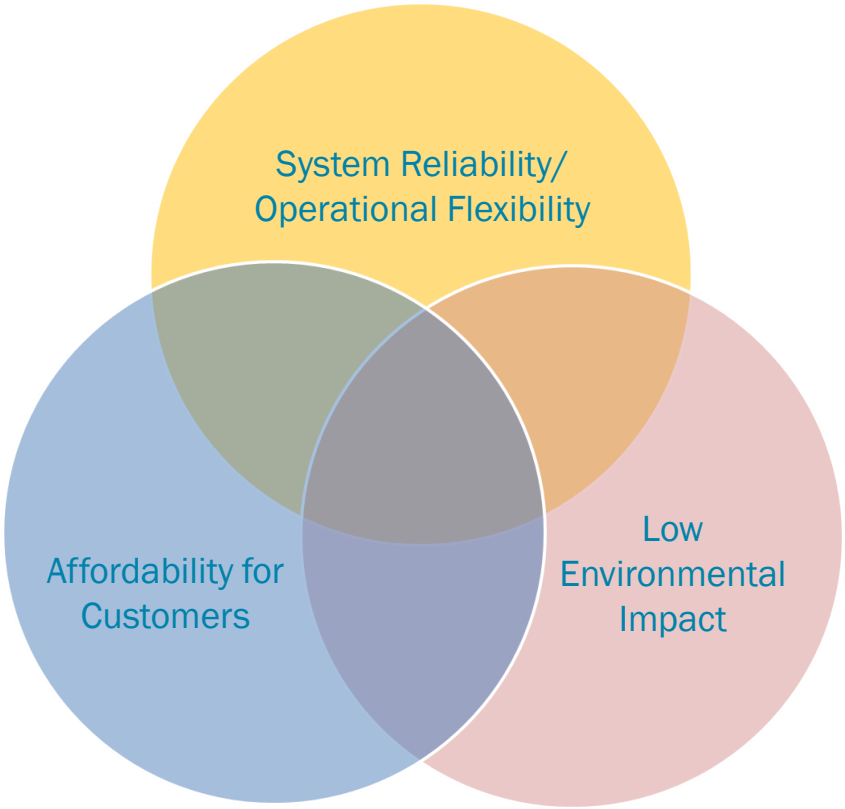
August 19th 2013

Agenda

- Use of the Carbon Metric framework to prioritize GHG reducing initiatives
- Linking with other jurisdictions- Need for partnerships
- CHP and GHG reductions
- Cost Containment

PG&E and AB 32

PG&E supports energy policy that ensures a cost-effective, reliable source of energy to our customers and helps reduce greenhouse gases statewide



- ✓We support AB 32 and believe it can be achieved cost-effectively
- ✓We are actively implementing all applicable AB 32 measures
- ✓Californians will be best served by a broad mix of cost-effective clean energy policies
- ✓We favor using rigorous and transparent cross-sectoral analysis to evaluate clean energy policies

Carbon Metric Framework

- Encourage the use of a standardized analytical framework to evaluate cost-effectiveness across all greenhouse gas (GHG) abatement activities
- "Status-check" on 2020 abatement estimates of major AB 32 measures
- Provide a tool for planning of post-2020 GHG policies
- Promote a constructive dialogue about sensible and affordable clean energy policy

Key Metric

$$\textit{Cost of Emission Reductions}\ (\$/\text{Metric Ton}) = \frac{\textit{Net Costs}\ (\text{NPV})}{\textit{GHG Emissions Abated}\ (\text{NPV})}$$

Where: ***Net Costs*** = Measure Cost Less Avoided Cost

GHG Emissions Abated = Measure Quantity * (Avoided Emissions Intensity Less Program Measure Emissions Intensity)

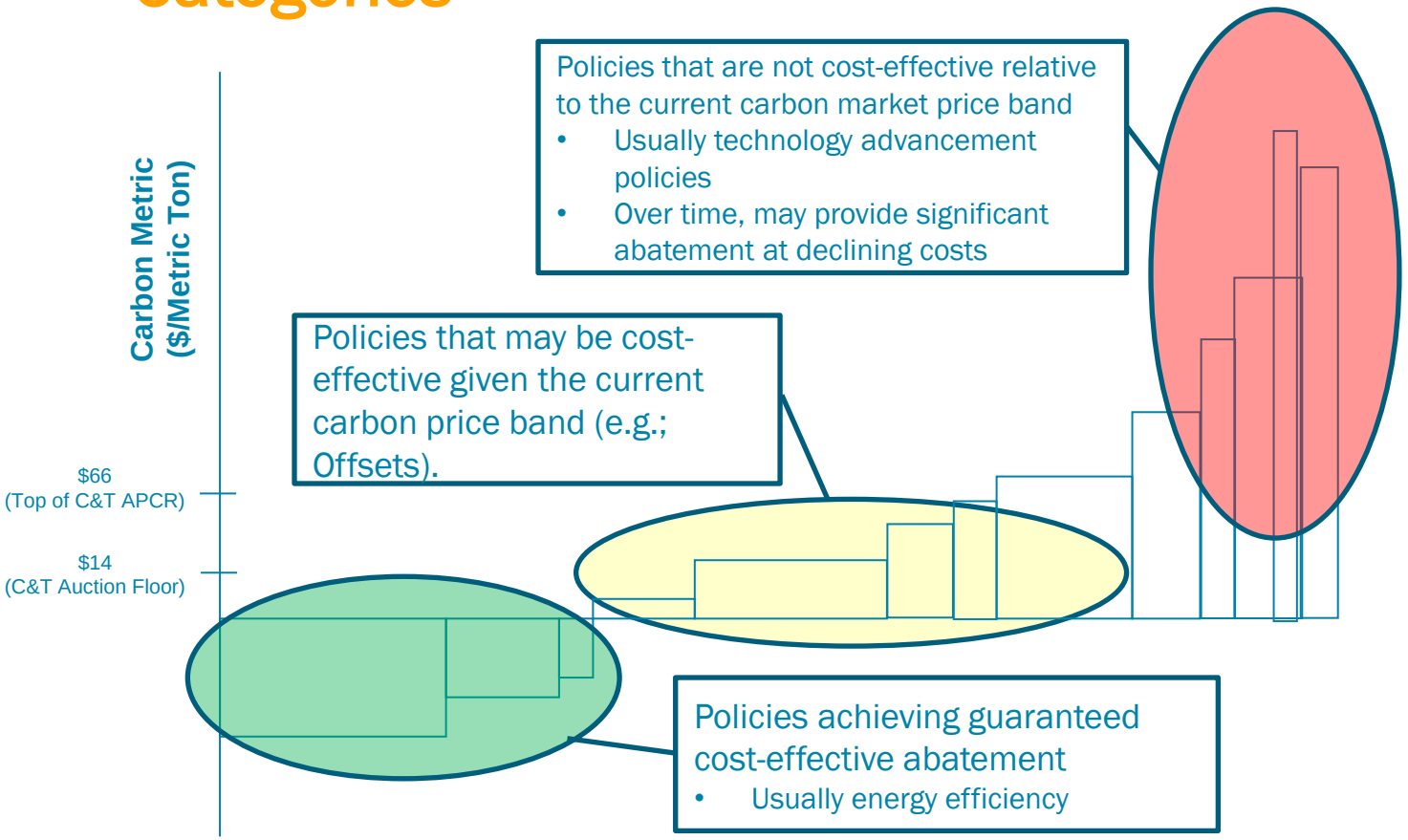
Costs & Benefits Included/Excluded in the Initial "Total Resource Cost" Carbon Metric Evaluation

	Benefits	Costs
Benefits/Costs - Included	Monetized Benefits • Energy Savings • Transportation Savings	Total Product/Project Costs (All Funding Sources) • Capital • Operating
Benefits/Costs - Excluded	• Health Benefits • Equity Benefits • Jobs Created • Macroeconomic Benefits • Local Benefits • National Security Benefits • Land Use Benefits • Fuel Diversity Benefits	• Health Impacts • Equity "Costs" • Jobs Lost • Macroeconomic Costs • Local Costs • Land Use Opportunity Costs • Fuel Diversity Costs
	Carbon Reduced or Avoided	**Carbon Created**
Emissions Included	Emissions Reduced • Avoided Based on Relevant Marginal Fuel and Carbon Intensity	Emissions Created (when applicable)
Emissions Excluded	Emissions avoided from upstream operations (e.g., project construction emissions)	Non-operating emissions (Construction, Fuel Transport, etc.)

- The Carbon Metric takes the CEC/CPUC's "total resource cost" approach and adapts it for use with greenhouse gas abatement measures
- It is clear which costs and benefits are included in the metric and which are excluded
- Assumptions and calculations are transparent
- The CEC/CPUC "societal cost" framework is recommended as a second screen applied only to measures with high TRC values

* For the transportation sector, analysis is completed on both a well-to-wheel (WTW) and a tank-to-wheels (TTW) basis

Cost Curve Depiction of Carbon Metric Policy Categories



The Carbon Metric framework facilitates comparison between abatement actions and the cap-and-trade carbon price to define three cost-effectiveness categories

Categories adapted from: *Summing up the Parts: Combining Policy Instruments for Least-Cost Climate Mitigation Strategies*, Christina Hood, International Energy Agency Information Paper 2011

Proposed Use of the Carbon Metric Framework

When planning future greenhouse gas abatement policies, the carbon metric can be used to sort proposals into three groups:

If The Carbon Metric is:	Cost-effectiveness Category	Proposed Action
1. Less than the 2020 Auction Floor Price (~$14/MT)	• Always cost-effective	• Prioritize implementation • Unlock abatement potential otherwise untapped by the carbon price signal • Identify and address any barriers to adoption
2. Between the 2020 Auction Floor Price and the Top 2020 Price of the Allowance Price Containment Reserve (APCR)	• May be cost-effective today, depending on carbon price	• Should be prioritized after measures in Group 1 • Explore likelihood of cap-and-trade price signal driving reductions in this category
3. Above the Top of the 2020 APCR (~$66/MT)	• Unlikely to be cost-effective under expected near-term carbon prices	• Ensure actions are focused on achieving market transformation and reducing costs for long-term carbon reductions • Evaluate if societal benefits outweigh societal costs • Devote extra efforts to cost reduction • Employ funding sources other than utility customer rates

Carbon prices in this table are values in 2020 presented in 2010 dollars

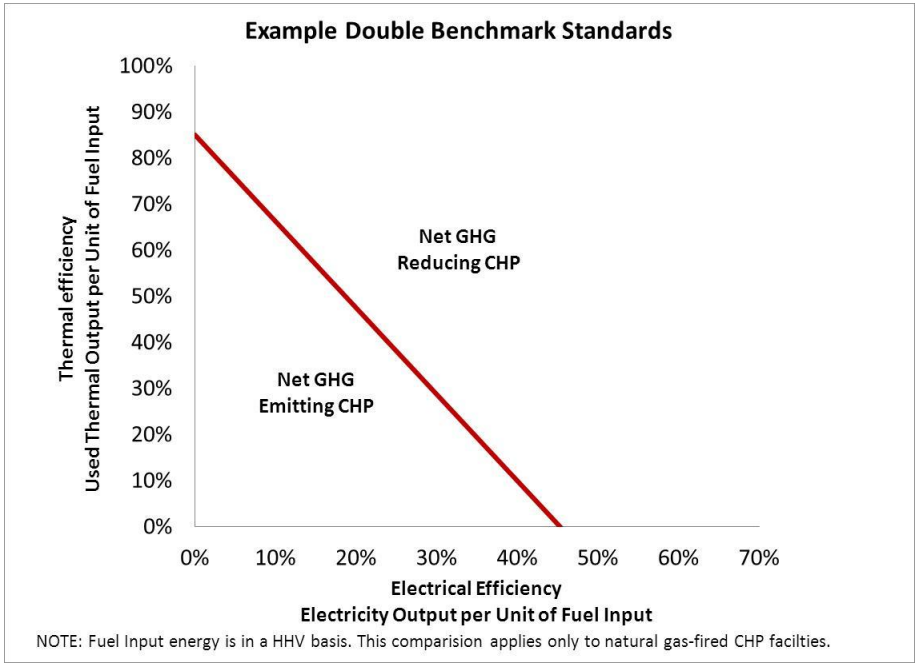
Linking with Other Jurisdictions- Need for Partnerships

- Achieving post-2020 targets without contributions from a broad coalition of jurisdictions will be more challenging and costly for California
- Renewed attention should be placed on working with the federal government, other states, and other governmental entities to set a plan to achieve post-2020 goals
- Broader linkage will promote innovation, build relationships, increase market size, reduce costs, and yield greater reductions globally
- Attracting and guiding private investment toward the development of low carbon technologies will provide momentum to meet post-2020 goals at a lower cost to California
- Increased opportunities for offset projects, with fewer, not greater, geographic limitations are needed to support cost containment.

Sustained Net Emissions Reductions Must be a Priority

Policy support for technologies that can offer only limited near-term reductions—such as topping-cycle combined heat and power (CHP)—should be reevaluated

Comparing CHP to Separate Heat and Power (SHP)

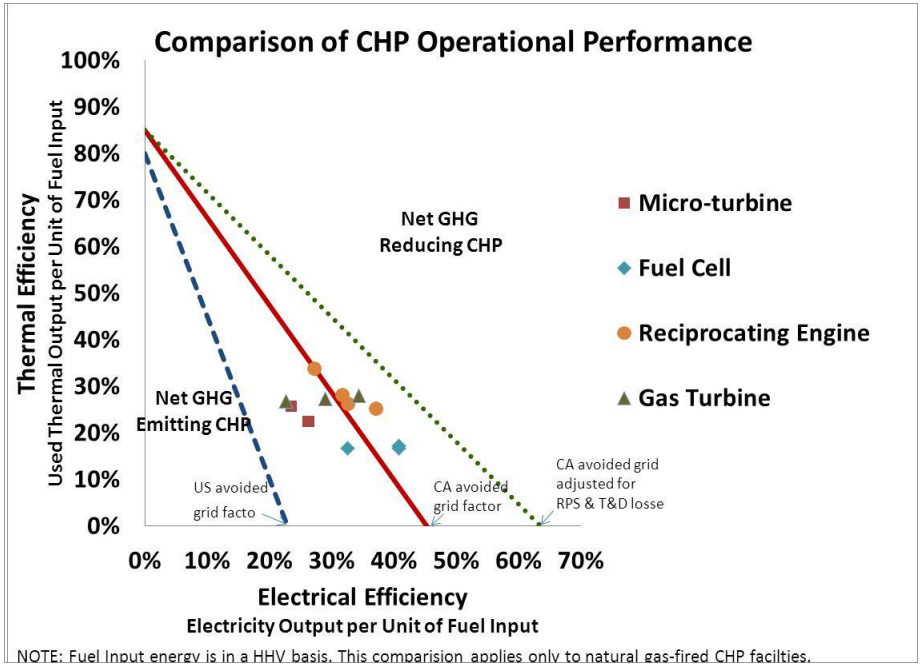


What is the Double Benchmark?

- Answers the question: Is the topping cycle CHP facility reducing GHGs?

Sustained Net Emissions Reductions Must be a Priority

A framework to properly evaluate the GHG performance of CHP systems



- Line represents - Separate heat and power double benchmark
- Dot represents - Electrical and thermal efficiency of example CHP technology type
  - Design performance: Based on 2012 ICF CHP potential study
  - Operational performance: Adjusted key performance drivers based on the review of public studies (such as SGIP impact evaluation reports)

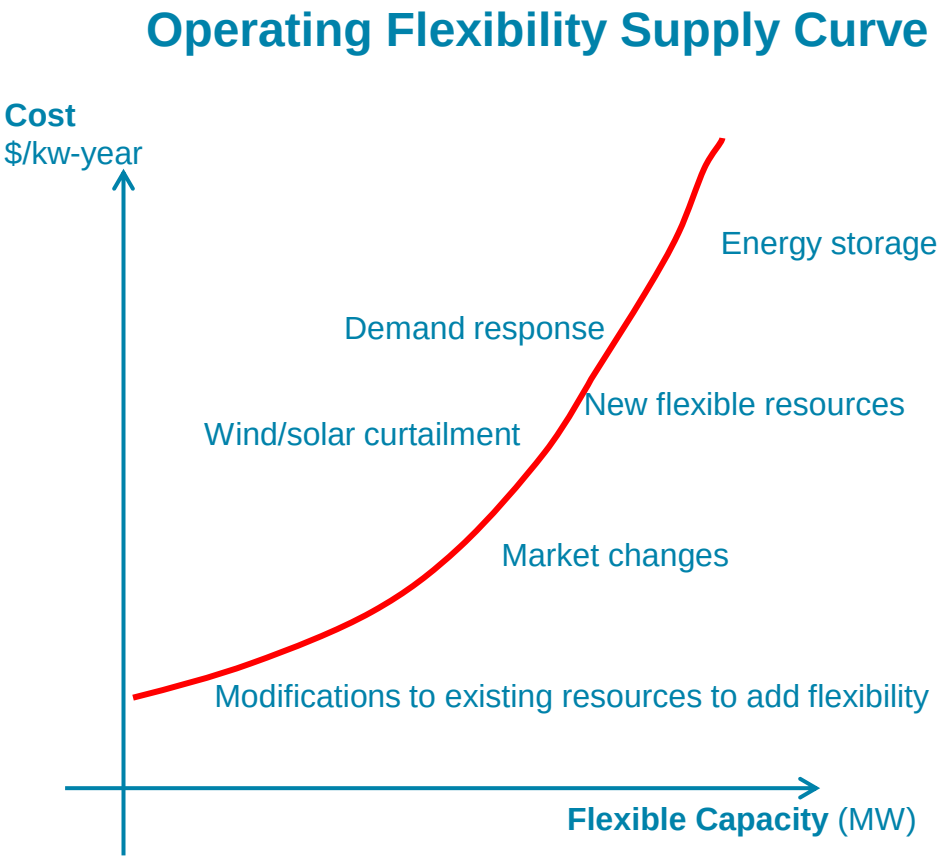
Performance of example CHP technologies relative to Double Benchmarks	
Relative to US SHP Double Benchmark	Net GHG Reducing
Relative to CA SHP Benchmark I	Mixed
Relative to CA SHP Benchmark II	Net GHG Emitting

Conventional CHP have limited GHG emissions reduction potential in California

A Cost-Effectiveness Framework Is Needed for Operating Flexibility

Once the amount and type of operating flexibility is determined (up vs. down; fast vs. slow response),

- Select the lowest cost alternatives to meet flexibility need
- No need to set aside particular technologies to meet increased flexibility need



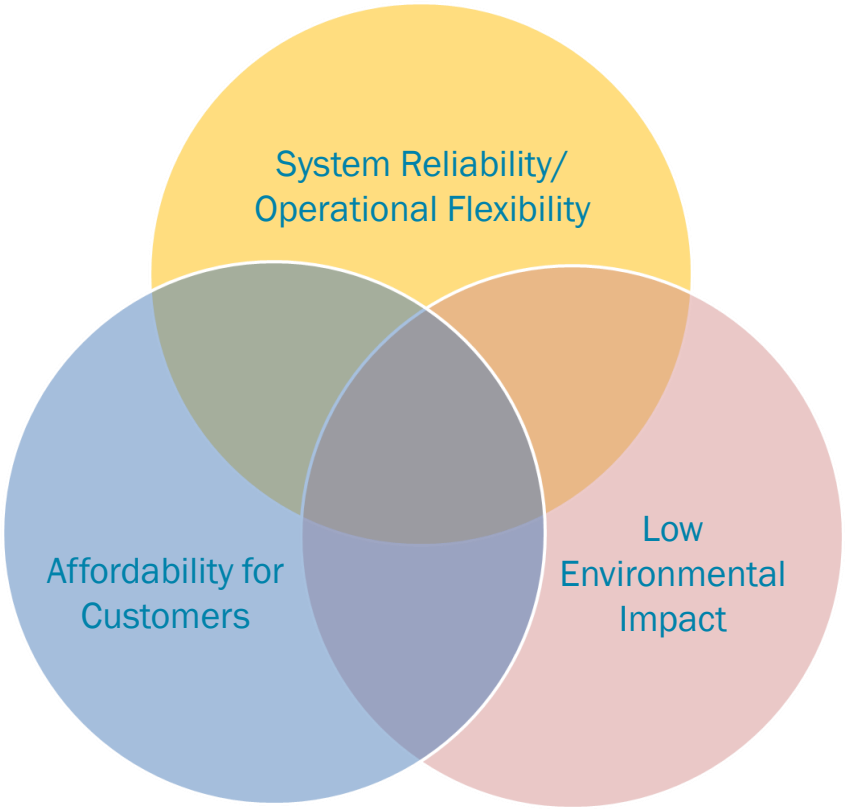
Seek Opportunities for Cost Containment

- PG&E supports a transition to an increased reliance on market-based measures to manage costs and promote innovation in the long-run

- California cannot resolve climate change unilaterally. Formal recognition of this fact through off-ramp recommendations for any post-2020 recommendations (contingent upon lack of action outside of California) will reduce emissions leakage, signal flexibility, and help manage potential adverse California economic impacts

California and AB 32

California should promote energy policies that ensure a cost-effective, reliable source of energy and help reduce greenhouse gases statewide



- ✓Recommend using a rigorous, cross-sectoral and transparent analysis to evaluate statewide opportunities for GHG reduction.
- ✓Promote linking with other jurisdictions to promote innovation, attract investment and expand opportunities for GHG reduction
- ✓Transition to market-based measures; consider off-ramps contingent on load or action outside California